

[Academic Script]

Market Efficiency (Part-2)

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Academic Script

MARKET EFFICIENCY (PART - 2) DIVIDEND DISCOUNT MODEL (DDM)

INTRODUCTION

Friends, let us start with one of the important topic from the view point of investors, i.e. Dividend.

Dividends are cash payments made by a corporation to its owners. Though cash dividends are paid to both preferred and common shareholders, most of the focus of the attention is on the dividends paid to the residual owners of the corporation, the common shareholders. Dividends paid to common and preferred shareholders are not legal obligations of a corporation and some corporations do not pay cash dividends. But for those companies that pay dividends, changes in dividends are noticed by investors—increases in dividends are viewed favourably and are associated with increases in the company's stock price, whereas decreases in dividends are viewed quite unfavourably and are associated with decreases in the company's stock price. Most models that use dividends in the estimation of stock value use current dividends, some measure of historical or projected dividend growth, and an estimate of the required rate of return. Popular models include the basic dividend discount model that assumes a constant dividend growth, and the multiple-phase models, which include the two-stage dividend growth model, and the stochastic dividend discount models. The Dividend Discount Model (DDM) is a procedure for valuing the price of a stock by using the predicted dividends and discounting them back to the present value. If the value obtained from the DDM is higher than what the shares are currently trading at, then the stock is undervalued.

Value of Stock = Dividend per share
Discount Rate - Dividend growth rate

The DDM is a tool used by many investors and analysts for choosing stocks. The greatest disadvantage of the DDM is that it is inapplicable to companies which do not pay dividends. In the DDM, a present stock value that is higher than a stock's market value indicates that the stock is undervalued and that it is a good time to purchase shares.

A security with a greater risk must potentially pay a greater rate of return to induce investors to buy the security. The required rate of return (aka capitalization rate) is the rate of return required by investors to compensate them for the risk of owning the security. This capitalization rate can be used to price a stock as the sum of its present values of its future cash flows. The dividend discount model prices a stock by the sum of its future cash flows discounted by the required rate of return that an investor demands for the risk of owning the stock. Future cash flows include dividends and the sale price of the stock when it is sold. This DDM price is the intrinsic value of the stock. If the stock pays no dividend, then the expected future cash flow is the sale price of the stock.

FORMUL	<u>A FOR C/</u>	ALCULATING	<u>i A STOCK'S IN</u>	<u>I I KINSIC</u>	<u>VALUE:</u>		
D_1		D_2			D _n		Р
	+		+	+		+	
(1+k) ¹		(1+k) ²			(1+k) ⁿ		(1+k) ⁿ

Where;

- D = Annual Dividend Payment
- k = Capitalization Rate
- P = Selling Price of Stock
- n = Number of Years until Stock is Sold

In an efficient market, the market price of a stock is considered equal to the intrinsic value of the stock, where the capitalization rate is equal to the **market capitalization rate**, the average capitalization rate of all market participants.

WHEN DDM IS MOST APPROPRIATE:

- 1. The firm has a history of dividend payments. This provides an analyst with a history from which to extrapolate future dividends. Otherwise, it is difficult to forecast when a non-dividend-paying firm will start paying dividends and how much they will eventually be.
- 2. The firm's dividends have a consistent relationship with the firm's earnings. Dividends should be related to firm earnings if they are to be a good indicator of future firm and shareholder wealth.
- 3. The valuation perspective is that of a noncontrolling shareholder. If the perspective is that of a controlling shareholder where firm cash flows can be controlled, a free cash flow model would be more appropriate.

DDMs are usually most applicable to mature, profitable firms with a history of stable dividend payments.

MODELS OF DDM:

1. <u>ZERO-GROWTH</u>

- It assumes that all dividends paid by a stock remain the same.
- Since the zero-growth model assumes that the dividend always stays the same, the stock price would be equal to the annual dividends divided by the required rate of return.

Intrinsic Value = Annual Dividends

Required Rate of Return

Example:

If a preferred share or stock pays dividends of Rs. 100.00 per year, and the required rate of return for the stock is 8%, then what is its intrinsic value?

Intrinsic Value = 100 / 0.08 = Rs. 1250.00

2. <u>CONSTANT-GROWTH MODEL (GORDON GROWTH MODEL)</u>

- It assumes that dividends grow by a specific percent annually.
- The constant-growth DDM (aka Gordon Growth model, because it was popularized by Myron J. Gordon) assumes that dividends grow by a specific percentage each year, and is usually denoted as g, and the capitalization rate is denoted by k.

Intrinsic Value = D₁

k – g

Where;

D₁ = Next Year' Dividend

k = Capitalization Rate

g = Dividend Growth Rate

Example:

• If a stock pays Rs. 20.00 dividend this year, and the dividend has been growing 5% annually, then what will be the price of the stock next year, assuming a required rate of return of 10%?

Stock Price (Year 0) =	20 / 0.05	=	Rs. 400.00
Stock Price (Year 1) =	20 (1.05) / (10% - 5%)	=	Rs. 420.00

- The constant-growth model is often used to value stocks of mature companies that have increased the dividend steadily over the years. Although the annual increase is not always the same, the constant-growth model can be used to approximate an intrinsic value of the stock using the average of the dividend growth and projecting that average to future dividend increases.
- Note that if both the capitalization rate and dividend growth rate remains the same every year, then the denominator doesn't change, so the stock's intrinsic value will increase annually by the percentage of the dividend increase.

STRENGTH OF GORDEN GROWTH MODEL:

- It is simple to understand and applicable to stable, mature firms that have constant growth in dividends.
- It can be used to value an entire stock market using the data for the entire stock market.
- g, the growth rate in dividends, can be estimated using g = nominal GDP (gross domestic product) growth, which is the sum of real GDP growth and long-term inflation. Note that estimated long-term dividend growth rates should not be much higher than the GDP growth rate because a firm's growth cannot greatly exceed the economy's over the long term.

• The Gordon growth model can be applied to firms that both pay dividends and repurchase stock if an analyst forecasts per share dividends that reflect the number of shares that will be repurchased over time. Note, however, that firms do not commit to repurchase policies the way they do dividend policies; forecasting repurchases is thus difficult.

LIMITATIONS OF GORDEN GROWTH MODEL:

- The model cannot be reliably applied to firms without a dividend history because forecasting future dividends becomes more difficult. Dividends should also have a consistent relationship with the firm's earnings.
- The model assumes that the dividend growth rate is constant, so it cannot be applied to firms with several different future growth rates in dividends. Recall also that the model assumes that the required return on equity (*r*) is greater than the dividend growth rate.
- The estimated stock value is very sensitive to the r g denominator. If the denominator changes by just 1%, for example, estimated valuations will change by a large monetary value. For this reason, an analyst should perform sensitivity analysis, where the stock is valued under different required returns and growth rates.
- Many, perhaps most, firms have nonconstant growth in future dividends, so the Gordon growth model cannot be directly applied. For these firms, we will need to use multistage models.

3. VARIABLE-GROWTH MODEL (MULTI-STAGE GROWTH MODELS)

- It typically divides growth into 3 phases: a fast initial phase, then a slower transition phase that ultimately ends with a lower rate that is sustainable over a long period.
- Variable-growth rate models (aka multi-stage growth models) can take many forms, even assuming the growth rate is different for every year. However, the most common form is one that assumes 3 different rates of growth: an initial high rate of growth, a transition to slower growth, and lastly, a sustainable, steady rate of growth. Basically, the constant-growth rate model is extended, with each phase of growth calculated using the constant-growth method, but using 3 different growth rates of the 3 phrases. The present values of each stage are added together to derive the intrinsic value of the stock.

LIMITATIONS OF DDM:

1) Limited Use:

The model is only applicable to mature, stable companies who have a proven track record of paying out dividends consistently. High growth companies, by definition face lots of opportunities in the future. They may want to develop new products or explore new markets. To do so, they may need more cash than they have on hand. Hence such companies have to raise more equity or debt. Obviously they cannot afford the luxury of having the cash to pay out dividends. For instance, investors following the dividend discount model would never have invested in companies like Google of Facebook. Even, a global behemoth like Microsoft did not have any track record of paying dividends until very recently. Hence, according to dividend discount model, these companies cannot be valued at all!

2) May Not Be Related To Earnings:

Another major disadvantage is the fact that the dividend discount model implicitly assumes that the dividends paid out are correlated to earnings. This means that higher earnings will translate into higher dividends and vice versa. But, in practice, this is almost never the case. Companies strive to maintain stable dividend payouts, even if they are facing extreme variations in their earnings. There have been instances where companies have been simultaneously borrowing cash while maintaining a dividend payout. Hence, assuming that dividends are directly related to value creation is a faulty assumption until it is backed by relevant data.

3) Too Many Assumptions:

The dividend discount model is full of too many assumptions. there are also assumptions regarding growth rate, interest rates and tax rates. Most of these factors are beyond the control of the investors. This factor too reduces the validity of the model.

4) Tax Efficiency:

In many countries, it may not be efficient to pay dividends. The tax structures are created in such a way that capital gains may be taxed lower than dividends. Also, many tax structures may encourage repurchase of shares instead of paying out dividends. In these countries most of the companies will not pay out dividends because it leads to dilution of value.

5) Control:

Lastly, the dividend discount model is not applicable to large shareholders. Since they buy a big stake in the corporation, they have some degree of control and can influence the dividend policy if they want to. Thus, for them, at least, dividends are an irrelevant metric.

TWO STAGE GROWTH MODEL

MEANING:

The two-stage dividend discount model takes into account two stages of growth. This method of equity valuation is not a model based on two cash flows but is a two-stage model where the first stage may have a high growth rate and the second stage is usually assumed to have a stable growth rate.

The two-stage model can be used to value companies where the first stage has an unstable initial growth rate and there is a stable growth in the second stage which lasts forever. The first stage may have a positive, negative, or a volatile growth rate and will last for a finite period while the second stage is assumed to have a stable growth rate for the rest of the life of the company. In this model, it is assumed that the dividend paid by a company also grows in the exact way i.e. in two such stages.

EXAMPLE

Let us take an example of a company that has paid a dividend of Rs. 4.00 this year. Assuming a higher growth for next 3 years at 15% and a stable growth of 4% thereafter; let us calculate the value using a two-stage dividend discount model assuming a required rate of return of 10%.

Current Dividend	= Rs. 4.00	
Dividend after 1st year will be	= Rs. 4.60	(4 x 1.15)
Dividend after 2nd year will be	= Rs. 5.29	(4.60 x 1.15)
Dividend after 3rd year will be	= Rs. 6.08	(5.29 x 1.15)

The second stage has a growth rate of 4% and hence the dividend value after 4th year will be Rs. $6.08 \times 1.04 = \text{Rs}$. 6.32.

Assuming this as the constant dividend for the rest of the company' life of the company, we arrive at the present values as follows:

Value = Rs. 6.32 / (10% - 4%) = Rs. 105.33.

Rs. 4.60 / (1 + 10%) ¹	=	Rs. 4.18
Rs. 5.29 / (1 + 10%) ²	=	Rs. 4.37
Rs. 6.08 / (1 + 10%) ³	=	Rs. 4.57
Rs. 105.33 / (1 + 10%) ³	=	Rs. 79.13
Present Value	=	Rs. 92.25

If the market price of the company's share is lower than the calculated value using the model; this means the stock price is undervalued which could mean that our estimates of the growth of the company are higher than what market perceives. On the other hand, if the market price is higher than the model output; it means the market expects the company to grow faster than our estimates.

- 1. <u>Error in estimation of length of First Stage</u>: It is very difficult to estimate the length of the first stage which could lead to over valuation or undervaluation of the stock under consideration. A shorter first stage will cause the valuation to be undervalued while a longer first stage could lead to overvaluation in a case of a high growth assumption in the first stage.
- 2. <u>Assumption of Growth</u>: assuming a direct jump from say, 12% in expansion stage to say, a 4% stable growth in back to back years may not be a scenario closer to reality as in real world scenario the growth rates will stabilise gradually over a period of time in multiple stages and not just two.
- 3. <u>Limited Applicability</u>: This model has its usage and applicability limited to companies which have higher growth rates during the 1st phase which is known and having stable growth rates thereafter.

MULTI STAGE DIVIDEND DISCOUNT MODEL MEANING:

Multi-stage dividend discount model is a technique used to calculate intrinsic value of a stock by identifying different growth phases of a stock; projecting dividends per share for each of the periods in the high growth phase and discounting them to valuation date, finding terminal value at the start of the stable growth phase using the Gordon growth model, discounting it back to the valuation date and adding it to the present value of the high-growth phase dividends. The basic concept behind the multi-stage dividend discount model is the same as constant-growth model, i.e. it bases intrinsic value on the present value of expected future cash flows of a stock. The difference is that instead of assuming a constant dividend growth rate for all periods in future, the present value calculation is broken down into different phases.

INTRINSIC VALUE =

PV of High G D ₁	rowth Phase Div D ₂	idend D _n	+	PV of Stable	Growth Phase dividends D _{n+1}
+ (1+r) ¹	+ + (1+r) ² ······	 (1+r) ⁿ	+	* (1+r) ⁿ	 r - g
Where; r = Cost of Ec D_{n+1} is the div r is the cost c g is the const	juity vidend in the firs of equity ant dividend gro	t year of th wth rate	e stable grow	rth phase	
EXAMPLE:					
Current Stoc	k Price	=	Rs. 40		
Expected Div	idend Growth Ra	ate =	25%, 20%, 1 respectively 6th year onv	5%, 10%, 5% f and 5% stable vards	or 5 Initial Years growth rate from

Recent Dividend	-	=	Rs. 1.5 per share		
Cost of Equity	-	=	10%		
. ,					
Year	Growth Rate	Div	idend Per Share	PV	Phase
Year 0	Growth Rate	Div	idend Per Share	PV NA	Phase NA
Year 0 1	Growth Rate NA 25%	Div	idend Per Share 1.50 1.88	PV NA 1.71	Phase NA Growth
Year 0 1 2	Growth Rate NA 25% 20%	Div	idend Per Share 1.50 1.88 2.25	PV NA 1.71 1.86	Phase NA Growth Growth
Year 0 1 2 3	Growth Rate NA 25% 20% 15%	Div	idend Per Share 1.50 1.88 2.25 2.59	PV NA 1.71 1.86 1.95	Phase NA Growth Growth Growth
Year 0 1 2 3 4	Growth Rate NA 25% 20% 15% 10%	Div	idend Per Share 1.50 1.88 2.25 2.59 2.85	PV NA 1.71 1.86 1.95 1.95	Phase NA Growth Growth Growth Growth
Year 0 1 2 3 4 5	Growth Rate NA 25% 20% 15% 10% 5%	Div	idend Per Share 1.50 1.88 2.25 2.59 2.85 2.99	PV NA 1.71 1.86 1.95 1.95 1.86	Phase NA Growth Growth Growth Growth Growth
Year 0 1 2 3 4 5 6	Growth Rate NA 25% 20% 15% 10% 5% 5%	Div	idend Per Share 1.50 1.88 2.25 2.59 2.85 2.99 3.14	PV NA 1.71 1.86 1.95 1.95 1.86	Phase NA Growth Growth Growth Growth Stable

PV of Stable Growth Phase = $1 / (1.10)^5 * 3.14 / (10\%-5\%) =$ Rs. 39.00

Intrinsic value of the stock

= PV of dividends in high-growth phase + PV of terminal value

= Rs. 9.33 + Rs. 39.00

= **Rs. 48.33**

Friends, we all know that from the Investor's point of view Price Earning Ratio (P/E Ratio) is very important for decisioning of buy/sell. In next topic, we will be covering up with the Price Earning Approach towards stock valuation.

PRICE EARNING APPROACH TO STOCK VALUATION

INTRODUCTION AND MEANING:

Value investors have long considered the Price Earnings ratio (also known as the P/E ratio) a useful metric for evaluating the relative attractiveness of a company's stock price. Made popular by the late Benjamin Graham, who was also known as the "Father of Value Investing" as well as Warren Buffett's mentor.

P/E ratio is one of the widely used and common stock valuation tool. It is a ratio of a company's current market share price compared to its annual earnings per share.

Price/Earnings Ratio = Earnings per Share (EPS)

In the aftermath of the Great Recession of 2008-2009, technology stocks traded at lower price-to-earnings ratios than many other types of businesses, such as consumer staples, because investors were frightened. They wanted to own companies that manufactured products that people would continue purchasing no matter how strained their finances; companies like <u>Procter & Gamble</u>, which makes everything from laundry soap to shampoo, <u>Colgate-Palmolive</u>, which makes toothpaste and dish soap, <u>Coca-Cola</u>, <u>PepsiCo</u>, and <u>The Hershey Company</u>. There is a saying in the international investing market for wealthy families that: <u>"When the going gets tough, the tough buy Nestle."</u> (Referring to Nestle, the Swiss food giant that is one of the largest companies in the world and has a stable of products that generate billions upon billions of dollars in nearly every country, no matter how terrible things get. From coffee, pasta, and baby food to ice cream, pet supplies, and beauty products, it is almost impossible for a typical member of Western Civilization to go a year without somehow, someway, directly or indirectly putting cash in Nestle's coffers, which explains one of the reasons it is one of the most successful long-term investments in existence).

EXAMPLE:

Company ABC may have reported earnings of Rs. 10 per share, while company XYZ has reported earnings of Rs. 20 per share. Each is selling on the stock market for Rs. 50. What does this mean?

Company ABC has a price-to-earnings ratio of 5, while Company XYZ has a P/E ratio of 2.5. This means company XYZ is much cheaper on a relative basis. For every share purchased, the investor is getting Rs. 20 of earnings as opposed to Rs. 10 in earnings from ABC. All else being equal, an intelligent investor should opt to purchase shares of XYZ.

SIGNIFICANCE OF P/E RATIO:

This ratio indicates how cheap or expensive a stock is. If P/E ratio of a stock is 10, then it tells that investors are willing to pay 10 times of a company's earning to buy that stock.

Stocks with P/E ratio less than 10 are often considered as cheaper. These types of stocks often provide a good opportunity for buying. Higher this ratio indicates that investors are expecting high earning growth in future.

Companies that don't make profit or make loss have zero or negative P/E ratio. Most analysts say that their P/E ratio does not exist.

TYPES OF P/E RATIO:

TRAILING OR CURRENT P/E

Analysts use earnings for the most recent 12-month period. As each quarter is completed, the oldest quarter's earnings per share is dropped and the most recent quarter is added to the total.

PROJECTED OR FORWARD P/E

The divisor is the projected or estimated earnings per share over the next 12 months. The estimate may be that of a single analyst or the consensus estimate from a group of analysts. It is important to know the identity and qualifications of the analysts providing an estimate to determine whether it is realistic.

COMBINED OR MIXED P/E

Some analysts use a combination of the two last quarters of actual earnings plus the first two quarters of projected earnings as the divisor.

LIMITATIONS OF THE PRICE-TO-EARNINGS RATIO:

Market Prices in the Short-Term Can Be Unpredictable

Short-term prices in the market are driven by emotions triggered by rumours and expectations. As a consequence, P/E ratios can get hits from time to time until facts and logic return to the investing public.

Reported Earnings Are Frequently Managed

Company CEOs and CFOs are aware that consistent, expected performance is generally rewarded with a higher ratio than erratic, unexpected results, even if positive. For this reason, management often seeks to level reported earnings by making accounting decisions that optimize them to meet investor expectations.

Abnormally High Growth Rates in Earnings Cannot Be Sustained Indefinitely

The impact of compounding is often overlooked as companies grow and mature. High growth rates attract competitors, which tends to reduce margins for an industry as a whole. As companies mature, growth rates tend to level out, reflecting the intensity of competition, cultural changes, and the complexity of managing a larger, multi-tiered organization.

Extraordinary Events Can Distort Future Expectations

Market leaders that have higher P/E ratios have shown an ability to constantly reinvent themselves, introducing a series of revolutionary products year after year. On the other hand, some companies gain market attention with a single product but are unable to sustain their advantage over time. Others may suffer unexpected losses due to external causes (such as new regulations or an industrial accident) and never recover.

Investors tend to "brand" companies based on their past rather than their future so that P/E ratios may not reflect the true value of the firm.

The Impact of Debt Is Overlooked

The value of a company is its combination of equity and debt. Leverage increases potential profit or loss, while price-to-earnings ratio considers just the equity value of a firm, not the total value of debt and equity combined. A company with a significant proportion of debt to total value carries more risk than a company with no debt.

P/E Ratios Can Be Difficult to Interpret

A low P/E can mean that a company's worth is undervalued by the market in the short-term and represents a buying opportunity for an investor. It can also mean that the company is expected to have problems in the future and smart investors have dumped the stock to avoid probable losses. Using P/E ratios alone for investment decisions is a risky and unwise practice.

SUMMARY:

The dividend discount model relates the present stock price to the present value of its future cash flows. It depends on projections about company growth rate and future capitalization rates of the remaining cash flows. So, even small change in either of these factors will greatly affect the calculated intrinsic value. Moreover, the greater the length of time considered, the more likely both factors will be wrong. Hence, the true intrinsic value of a stock is unknowable, and thus, it cannot be determined whether a stock is undervalued or overvalued based on a calculated intrinsic value, since different investors will have a different opinion about the company's future.

Price-to-Earnings ratios are particularly useful in making immediate comparisons and superficial analysis as well as its limitations. Despite of whatever limitations of the P/E ratio, the investment community makes extensive use of this valuation metric. Investors considering a stock purchase compare the current P/E ratio against the stock's long-term (three to five years) historical record to reach to a logical conclusion.

----- THANK YOU FRIENDS ------